

## SEVERE LOCAL STORMS, SEPTEMBER 1941—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Duluth, Minn.	14	2:10-4:35 p.m.			\$125,000	Rain and flood	Due to a prolonged wet period, the ground in this area was saturated before this storm started causing nearly all water to run off. 3.30 inches of rain recorded on the 14th with damage resulting mainly from flooding and caving in of basements in houses and business establishments. Much damage to streets and sewer systems; tracks of railroads near the edge of the lake undermined; and electric service interrupted.
Gilman, Minn., and vicinity	14	3:45 p. m.	275		60,000	Possible tornado	Several barns demolished; many residences and buildings damaged; trees uprooted, haystacks scattered, corn flattened, and poultry killed. Length of path 8 miles, from southwest to northeast. A funnel cloud observed 5 miles southwest of Gilman. Property damage, \$50,000; loss in growing crops, \$10,000.
Halbur, Iowa, vicinity of	14	4:30 p. m.			3,000	Wind	Property damaged, \$1,000; corn flattened, \$2,000.
Hornick, Iowa, vicinity of	14				4,000	Rain and wind	Property damaged.
Lancaster County, Nebr., southern portion.	14-15	3 p. m.-5 a. m.	15		20,000	Rain	Creeks overflowed, flooding highways, homes, and fields, causing floods in the Blue and Nemaha Rivers.
Rochester, Albert Lea, and Weaver, Minn., and vicinities.	15	A. m. and p. m.			15,000	Rain and flood	Heavy to excessive rains in connection with a severe thunderstorm caused much damage to highways and bridges. Basements flooded and streets washed out. At Weaver a hillside washed over a highway. Some loss in growing crops.
Hallock, Minn., and vicinity	15	4-6 p. m.			2,000	Thunderstorm and hail.	Storm moved from northwest to southeast and was accompanied by high winds. Property damage, \$500; loss to growing crops, \$1,500.
Denton to Rokeby, Nebr.	15	6-7 p. m.	15		1,000	Hail and rain	Creeks flooded; small hail damage.
Guthrie Center to Dike, Iowa, and vicinities.	15	9 p. m.	12-3		15,000	Tornadoic wind	Trees and branches blown down and windmills and small buildings wrecked, and some corn flattened. Near Dike a new, substantial barn totally wrecked.
Cassville, Wis., vicinity of	15				1,500	Wind	Barn and some buildings damaged.
Sloan, Iowa, vicinity of	21	2 p. m.			900	do	Buildings in small area damaged; boy cut by flying glass.
Ogden, Logan, and Farmington, Utah, and vicinities.	21-22	P. m.			250,000	do	An airplane hangar at the old Municipal airport and a small brick apartment, both under construction, were demolished, together with a number of small airplanes stored in the hangar. A firehouse in north Ogden partly destroyed and many residences in eastern portion of the city damaged. Several hundred shade trees down. Loss in crops, \$100,000. There was extensive loss in apples and ensilage corn crops and in a lesser degree to prunes and pears. Apples were blown from trees and corn flattened. Total estimated loss in Ogden, \$100,000. Two persons injured and power, light, and telephone service was interrupted. Structural damage in a much less degree occurred in Logan and Farmington, with widespread disruption to power and telephone service in the entire area.
Mesa Service Station, N. Mex.	23	4-5:30 p. m.	15			Heavy hail	20 sections of range grass damaged.
Lookeba, Okla.	24	5-5:30 p. m.	15		500	Hail and wind	Loss in cotton and corn; path 20 miles long.
Erie, Pa., and vicinity	25				600	Wind	Damage to telephone lines and trees; 2 automobiles damaged by falling signs.
Indiana	25				100,000	Tropical disturbance.	High winds general over the entire State with considerable loss, especially to apples. Some trees and wires down and property damaged.
New York State, counties bordering on Lakes Erie and Ontario and the upper St. Lawrence.	25				2,000,000	Wind	This storm of tropical origin, is reported as being the worst in any September in these areas. Maximum wind velocities ranged from 40 to 60 miles per hour. There was severe damage to orchards, telephone, telegraph and electric power lines, and considerable damage to buildings, small craft, automobiles, etc. The amount estimated for damage in western New York, only. The New York State Department of Agriculture reported loss in 1,500,000 bushels of apples.
Ohio, entire State	25			1		do	Considerable damage to property and heavy loss to orchardists. Several persons injured. Estimate of damage not given.

<sup>1</sup> Miles instead of yards.

## SOLAR RADIATION AND SUNSPOT DATA FOR SEPTEMBER 1941

(Solar Radiation Investigations Section, I. F. HAND in charge)

## SOLAR RADIATION OBSERVATIONS

By SYLVIA NEEDRE

Measurements of solar radiant energy received at the surface of the earth are made at 9 stations maintained by the Weather Bureau and at 12 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Madison, Wis.; Lincoln, Nebr.; and Albuquerque, N. Mex.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau station at Madison and at Blue Hill Observatory.

The geographic coordinates of the stations, descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data obtained, up to the end of 1939, are given in the MONTHLY WEATHER REVIEW for December 1937, April 1941, and September 1941.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means

and their departures from normal (means based on less than 3 values are in parentheses). At Lincoln, Madison, Albuquerque, and Blue Hill the observations are obtained with a recording thermopile, checked by observations with a Smithsonian silver-disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the daily total amounts of radiation received on a horizontal surface from both sun and sky for all stations except Fairbanks, Alaska; and also the weekly means, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the Eppley pyrheliometer recording either on a microammeter or a potentiometer. If the daily figures for total solar and sky radiation at Fairbanks should be desired, they may be obtained approximately 2 months after the date of the observation by writing to the Solar Radiation Investigations Supervisory Station, Blue Hill Observatory, Milton, Mass.

Beginning with this issue, ultraviolet values obtained at San Juan will be included in table 2. These data represent the radiation below 3132 Ångströms received on a horizontal surface. The unit is 1 milligram calorie, or one-thousandth of a gram calorie (see Kenrick and Ortiz, Measurements of Ultraviolet Solar Radiation in

Puerto Rico, *Trans. Amer. Geophys. Union* (Section of Meteorology), volume 38, pp. 134-140, April 1938; and Studies in Solar Radiation and Their Relationship to Biophysics and the General Problem of Climate and Health, by G. W. Kenrick and George Del Toro, Jr., *Puerto Rico Journal of Public Health and Tropical Medicine*, June 1940, volume 15, No. 4, Columbia University Press. Pending international agreement, Coblentz intends using 3200 Å as the wavelength limit; see The Spectral Range of Ultraviolet Solar Radiation Useful in Bioclimatology, by W. W. Coblentz, *Bulletin American Meteorological Society*, October 1941, pp. 316-318.)

Through the courtesy of Dr. O. C. Magistad, Assistant Chief of the Bureau of Plant Industry, United States Department of Agriculture, and Dr. L. A. Richards, Director of the United States Regional Laboratory at Riverside, Calif., we include this month about 1 year's record of total solar and sky radiation received on a horizontal surface at Indio and Torrey Pines, Calif. A comparison of these values with those obtained at La Jolla and Riverside is interesting because of the relatively close proximity of the four stations and their widely divergent totals. The pyrheliometer at La Jolla is located on one of the laboratory buildings of the Scripps Institution of Oceanography about 100 feet from the Pacific Ocean. The early morning fogs over this station result in much lower average morning values of radiation than at Torrey Pines, located on a bluff about 7 miles inland from La Jolla. The San Jacinto range lies between Riverside and Indio, with Riverside in the citrus belt and Indio in the date palm region 100 feet below sea level in the Imperial Valley. While Indio receives a very high percentage of sunshine, the region is visited frequently by severe duststorms.

Table 1 shows that normal incidence radiation averaged slightly above normal for the month at all three stations for which means have been computed.

Table 2 shows an excess in the amount of total solar and sky radiation received on a horizontal surface during September at all stations for which normals have been computed with the exception of Lincoln, Albuquerque and Friday Harbor, which is slightly below normal.

Polarization measurements made on 6 days at Madison give a mean of 70 percent with maxima of 76 percent of the 6th and 17th. All of these values are close to average for September.

The results of recalibration of instruments throughout the United States are given in a paper which appears on page 262 of this REVIEW.

TABLE 1.—Solar radiation intensities during September 1941

[Gram-calories per minute per square centimeter of normal surface]

## MADISON, WIS.

Date	Sun's zenith distance										Local mean solar time
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e.
Sept. 6.....	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.
Sept. 10.....	9.83	0.90	1.02	1.13	1.28	1.46	1.28	1.13	1.02	0.90	7.57
Sept. 17.....	7.57	.96	1.06	1.14	1.30	1.48	1.30	1.14	1.06	.96	8.18
Sept. 18.....	8.81	.98	1.06	1.19	1.35	1.49	1.31	1.19	1.06	.98	9.14
Sept. 22.....	7.78	.74	.88	1.02	1.17	1.42	1.22	1.17	1.02	.88	8.48
Sept. 26.....	12.68	.53	.71	.91	1.07	1.34	1.08	1.07	.91	.71	12.24
Sept. 26.....	5.16	.74	.71	.79	1.22	1.47	1.15	1.03	1.03	1.22	5.36
Means.....		.81	.91	1.03	1.23	1.44	1.19	1.03	1.03	.81	
Departures.....		+.05	+.03	+.03	+.08	+.05	+.04	+	+	+	

TABLE 1.—Solar radiation intensities during September 1941—Con.  
LINCOLN, NEBR.

Date	Sun's zenith distance										Local mean solar time
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e.
Sept. 5.....	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.
Sept. 6.....	11.38	.....	.....	.....	1.23	1.08	.....	.....	.....	.....	7.87
Sept. 9.....	8.18	.....	.....	.....	1.08	.....	1.25	1.10	0.97	0.88	16.79
Sept. 10.....	7.87	.....	0.90	1.03	1.20	.....	1.14	.96	.84	.71	9.14
Sept. 11.....	9.47	.....	.96	1.08	1.23	.....	1.21	1.06	.92	.79	9.47
Sept. 16.....	13.13	.....	.....	.....	1.14	.....	1.19	1.03	.90	.82	10.21
Sept. 18.....	15.11	0.71	.82	.94	1.13	.....	.....	.....	.....	.....	16.79
Sept. 19.....	16.79	.64	.....	.....	1.10	.....	.....	.....	.....	.....	16.21
Sept. 20.....	16.79	.71	.84	.96	1.10	.....	.....	.....	.....	.....	16.21
Sept. 22.....	11.38	.....	.....	.....	.....	.....	.....	.94	.84	.75	14.10
Sept. 23.....	10.59	.....	.....	.79	1.08	.....	.....	.....	.....	.....	11.38
Sept. 26.....	6.76	.77	.88	1.05	1.21	.....	1.10	.....	.....	.....	7.57
Sept. 30.....	7.04	.....	.96	1.11	1.29	.....	.....	.....	.....	.....	10.21
Means.....		.71	.89	.99	1.16	.....	1.18	1.02	.89	.79	.....
Departures.....		-.03	-.04	-.02	+.01	.....	+.02	+.04	+.05	+.05	.....

## BLUE HILL, MASS.

Sept. 3.....	7.6	0.79	0.90	1.00	.....	.....	1.25	1.12	1.02	0.94	8.8
Sept. 6.....	14.7	.....	.....	.....	.....	.....	.....	.....	.75	.64	11.1
Sept. 7.....	10.3	.65	.76	(.91)	1.12	1.25	.....	.....	.....	.....	7.9
Sept. 8.....	7.1	.86	.95	1.06	1.19	1.42	1.20	.97	.....	.....	10.7
Sept. 9.....	8.8	.....	.....	.90	.....	.....	.....	.....	.....	.....	5.8
Sept. 12.....	6.5	.....	.....	1.04	.....	.....	.....	.....	.....	.....	3.8
Sept. 13.....	6.4	.97	1.05	.....	.....	1.44	1.22	1.03	.87	.74	15.8
Sept. 16.....	13.2	.51	.60	.75	.....	.....	.....	.....	.73	.67	5.6
Sept. 18.....	8.8	.87	.95	.....	.....	.....	.....	.....	.....	.....	6.1
Sept. 19.....	6.3	.90	.....	.....	.....	.....	.....	.....	.....	.....	5.2
Sept. 20.....	6.5	.....	1.03	1.15	1.27	.....	.....	1.06	.91	.....	7.4
Sept. 21.....	8.8	.75	.86	.98	1.15	.....	1.12	.95	.81	.69	8.8
Sept. 22.....	9.9	.79	.91	1.02	1.17	.....	.....	.....	.82	.....	12.3
Sept. 23.....	8.6	.67	.72	.83	1.03	.....	.....	.....	.....	.....	10.3
Sept. 24.....	8.8	.67	.77	.92	1.08	.....	.....	.....	.....	.....	8.2
Sept. 25.....	9.2	.....	.....	.....	.....	1.49	1.22	1.08	(.84)	(.79)	4.4
Sept. 30.....	3.2	.....	.98	(1.09)	.....	.....	.....	.....	.....	.....	.....
Means.....		.78	.89	.96	1.14	1.40	1.20	1.04	.84	.75	.....
Departures.....		-.02	-.02	-.06	+.01	+.03	+.07	+.10	+.04	+.07	.....

## ALBUQUERQUE, N. MEX.

Sept. 1.....	13.15	.....	.....	.....	.....	.....	1.21	1.08	0.90	0.80	11.38
Sept. 2.....	12.24	0.81	0.90	1.03	1.16	1.42	1.17	1.04	.....	.....	11.38
Sept. 4.....	5.36	.....	.....	.....	.....	.....	1.31	1.14	1.02	.91	6.02
Sept. 5.....	3.50	.....	.....	.....	.....	1.56	1.34	1.20	1.08	.95	4.75
Sept. 7.....	7.57	.84	.95	1.07	1.24	.....	1.29	1.14	1.02	.88	7.29
Sept. 8.....	7.04	.91	1.04	1.13	1.30	.....	.....	.....	.....	.....	6.50
Sept. 9.....	6.76	.....	.....	.....	.....	.....	1.32	1.18	1.01	.90	5.56
Sept. 10.....	4.36	.86	1.01	1.12	1.31	1.49	.....	.....	1.04	.....	7.87
Sept. 11.....	7.57	.90	1.01	1.12	1.34	.....	1.30	1.17	1.06	.97	7.87
Sept. 15.....	10.20	.88	1.02	1.14	1.28	1.52	1.30	1.17	1.04	.95	8.49
Sept. 16.....	5.79	.94	1.03	1.14	1.27	1.49	1.30	1.16	1.07	.97	6.27
Sept. 17.....	8.49	.85	.95	1.07	1.19	1.47	1.25	1.08	.98	.90	9.14
Sept. 18.....	10.20	.....	.....	1.08	.....	1.49	1.25	1.09	.99	.....	10.20
Sept. 19.....	11.81	.82	.94	1.05	1.19	1.48	.....	.....	.....	.....	11.81
Sept. 20.....	11.81	.....	.95	.....	.....	.....	.....	.....	.....	.....	12.24
Sept. 21.....	10.98	.88	.....	1.13	1.27	.....	.....	.....	.....	.....	9.83
Sept. 22.....	9.46	.....	.....	.....	.....	.....	1.14	.99	.88	.....	9.46
Sept. 23.....	8.18	.....	1.05	1.16	1.31	1.55	1.27	1.14	1.01	.93	6.76
Sept. 24.....	5.36	.....	1.01	1.14	1.30	1.53	1.29	1.14	1.03	.94	4.75
Sept. 25.....	4.95	.99	1.12	1.20	1.34	.....	1.35	1.14	1.12	1.01	5.15
Sept. 27.....	7.87	.88	1.00	1.13	1.29	.....	.....	.....	.....	.....	9.46
Sept. 29.....	6.27	.....	.....	.....	.....	.....	1.28	1.14	1.03	.94	8.81
Sept. 30.....	8.18	.....	.....	.....	1.29	.....	1.30	1.14	.99	.92	8.81
Means.....		.88	1.00	1.11	1.27	1.50	1.28	1.14	1.02	.92	.....

## LATE DATA

## Blue Hill, Mass.

July 3.....	9.6	.....	.....	.....	0.99	1.17	.....	.....	.....	.....	10.7
July 5.....	11.9	.....	.....	.....	.....	.....	.....	0.70	0.59	.....	11.9
July 6.....	12.8	0.58	0.70	0.78	.97	.....	.....	.98	.89	.....	11.5
July 10.....	11.5	.52	.64	.89	.99	.....	.....	.....	.....	.....	9.6
July 14.....	13.7	.....	.....	.99	.....	.....	.....	.....	.....	.....	11.1
July 15.....	10.7	.....	.....	.....	.....	1.27	0.96	.82	.71	.....	11.9
July 16.....	11.5	.....	.....	.....	.....	.....	.....	.71	.51	.....	13.2
July 21.....	10.3	.77	.87	1.03	1.13	1.28	.92	.72	.60	0.47	9.9
July 22.....	10.7	.43	.51	.63	.83	.....	.....	.....	.....	.....	12.8
July 26.....	17.5	.....	.....	.....	.....	.....	1.02	.....	.....	.....	15.3
July 27.....	14.3	.....	.....	.....	1.00	.....	.....	.....	.69	.....	10.7
Mean.....		.58	.68	.85	.99	1.24	.97	.79	.67	.47	.....
Departure.....		-.03	-.01	-.02	-.06	-.02	-.04	-.06	-.04	-.18	.....

1 Extrapolated.

TABLE 1.—Solar radiation intensities during September 1941—Con.

## LATE DATA—Continued

Blue Hill, Mass.—Continued

[Gram-calories per minute per square centimeter of normal surface]

Date	Sun's zenith distance										Local mean solar time	
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		1:30 p. m.
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0		5.0
	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
August 2	15.3										13.7	
August 3	12.3	.47	.57	.71	.89	1.09					11.9	
August 4	11.9	.56		.79	.96						13.2	
August 5	13.2	.62		.84	.96						11.5	
August 6	11.5	.49		.72	.86						10.7	
August 7	9.6	.43	.52	.66	.89						8.8	
August 8	11.9	.49	.60	.73		1.27	.94	.75	.65	.56	11.5	
August 9	11.9	.78	.85	.91	1.02						12.3	
August 10	11.9		.95	1.03	1.13	1.24					9.2	
August 11	8.2	.77	.87	.98	1.10	1.28					9.6	
August 12	9.2					1.29					5.8	
August 21	9.9	.81	.94					.76	.65	.54	11.1	
August 22	12.1							.95	.81	.68	13.2	
August 24	8.8	.82	.89	.99	1.12			1.01	.87	.78	8.6	
August 28	6.1	.89	.98	1.11	1.19		1.17				5.8	
Mean		.65	.80	.86	1.01	1.23	1.06	.82	.70	.61		
Departure		-.02	-.03	-.05	-.05	-.05	+.01	-.05	+.01	+.03		

TABLE 1.—Solar radiation intensities during September 1941—Con.

## LATE DATA—Continued

Blue Hill, Mass.—Continued

[Gram-calories per minute per square centimeter of normal surface]

Date	Sun's zenith distance											Local mean solar time
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.	
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	
	<i>mm.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>mm.</i>	
September 3	7.6	.79	.90	1.00			1.25	1.12	1.02	.94	8.8	
September 6	14.7								.75	.64	11.1	
September 7	10.3	.65	.76	(.91)	1.12	1.25					7.9	
September 8	7.1	.86	.95	1.06	1.19	1.42	1.20	.97			10.7	
September 9	8.8		.90								5.8	
September 12	6.5	.96	1.04								3.8	
September 13	5.4	.97	1.05			1.44	1.22	1.03	.87	.74	15.8	
September 16	13.2	.51	.60	.75					.73	.67	5.6	
September 18	8.8	.87	.95								5.2	
September 19	6.3	.90									6.1	
September 20	6.5		1.03	1.15	1.27			1.06	.91		7.4	
September 21	8.8	.75	.86	.98	1.15		1.12	.95	.81	.69	8.8	
September 22	9.9	.79	.91	1.02	1.17				.82		12.3	
September 23	8.6	.67	.72	.83	1.03						10.3	
September 24	8.8	.67	.77	.92	1.08						8.2	
September 25	9.2					1.49	1.22	1.08	(.84)	(.79)	4.4	
September 30	3.2		.98	(1.09)								
Mean		.78	.89	.96	1.14	1.40	1.20	1.04	.84	.75		
Departure		-.02	-.02	-.06	.00	+.03	+.07	+.10	+.04	+.07		

TABLE 2.—Daily totals and weekly means of solar radiation (direct + diffuse) received on a horizontal surface

[Gram-calories per square centimeter]

	Washington	Madison	Lincoln	New York	Chicago	Fresno	Albuquerque	Fairbanks	Newport	Ithaca	Cambridge	Blue Hill	Friday Harbor	Riverside	New Orleans	La Jolla	State College	San Juan	San Juan
Sept. 3	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	U. V. below 3132
Sept. 4	224	206	446	440	290	596	578		580		548	567	93	511	542	533	173	522	365
Sept. 5	106	328	443	117	406	583	618		388		435	408		538	551	384	212	450	211
Sept. 6	326	506	559	258	468	573	621		159		161	99	476	511	569	241	439	94	283
Sept. 7	545	524	438	544	544	563	465		525		518	501	487	511	563	498	509	90	153
Sept. 8	476	375	492	522	482	573	597		524		531	502	256	476	418	538	303		239
Sept. 9	487	110	360	571		574	560		561		553	567	213	539	523	514	562	565	432
Sept. 10	499	87	488	360	364	555	613		247		288	307	378	510	431	446	503	525	311
Mean	381	305	461	402	426	574	579	275	426		433	422	332	514	514	451	386	502	293
Departure	-11	-70	+17	+65	+61	+12	+23	+68	-39		+45	+29	-82	+44	+92	-37			
Sept. 11	465	542	522	409	545	543	535		209		376	410	286	537	526	576	374	366	301
Sept. 12	534	331	538	522	549	563	535		451		495	457	378	487	359	429	473	499	416
Sept. 13	568	477	493	583	488	558	535		538		500	500		489	496	518	585	469	433
Sept. 14	504	406	128	501	463	546	294		546		525	574		502	261	428	553	148	246
Sept. 15	544	395	268	491	489	556			506		470	467		498	149	552	556	239	281
Sept. 16	538	145	528	446	410	544			469		477	464		521	394	542	503	284	180
Sept. 17	522	350	528	431	249	529	568		455		390	453		515	310	487	505	298	152
Mean	525	387	401	483	456	548	494	174	454		462	475		507	356	505	507	431	295
Departure	+148	+43	-18	+154	+125	+21	-4	-24	+49		+70	+96		+61	-2	+5			
Sept. 18	483	513	404	411	530	513	506		420		399	426		457	355	264	348	301	184
Sept. 19	461	479	466	508	548	529			516		506	520	395	406	518	430	532	475	396
Sept. 20	504	463	456	516	486	517	525		539		492	513	215	517	596	345	544	499	347
Sept. 21	526	423	406	503	450	532			526		457	512	321	499	587	506	519	250	374
Sept. 22	458	423	290	435	463	527	295		615		469	488	320	529	318	527	522		309
Sept. 23	462	436	360	353	427	527	260		468		451	477		536	100	543	442	336	353
Sept. 24	490	328	459	447	373	618	548		432		393	424		523	440	536	447	420	297
Mean	483	438	414	453	468	523	427	238	488		452	480	313	495	416	450	479	424	311
Departure	+109	+87	+1	+141	+117	+36	-33	+64	+93		+76	+104	-11	+26	+40	+30			
Sept. 25	427	320	75	399	362	515	549		474		377	314		504	284	506	441	403	307
Sept. 26	306	173	356	441	93	481	554		455		387	449		483	371	478	145	432	314
Sept. 27	379	452	446	370	456	478	459		395		443	425	281	489	392	514	342	465	309
Sept. 28	415	346	287	418	408	481	354		351		336	330	368	478	410	468	448	176	131
Sept. 29	426	119	254	225	89	463			306		379	364	94	399	461	403	415	228	94
Sept. 30	418	287	42	303	254	476	314		366		338	390	252	351	548	284	303	449	313
Mean	210	167	437	300	104	481	535		331		267	356	261	476	525	481	395	465	333
Departure	369	266	271	351	252	482	416	170	382		361	377	245	454	427	448	355	377	258
Departure	+18	-32	-93	+66	-34	+33	-16	+34	+39		+42	+35	-57	+3	+46	+55			

## ACCUMULATED DEPARTURES ON SEPTEMBER 30

+5,005	+3,549	-6,083	+17,731	+15,330	-1,246		-1,596	-2,128		+1,680	-84		-197	+11802	-3,472				
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TABLE 2.—Daily totals and weekly means of solar radiation (direct + diffuse) received on a horizontal surface—Continued

## LATE DATA

	1940, week beginning—													
	July 1	July 8	July 15	July 22	July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26	Sept. 2	Sept. 9	Sept. 16	Sept. 23	
Indio, Calif. ....	cal. 748	cal. 667	cal. 766	cal. 688	cal. 698	cal. 641	cal. 638	cal. 638	cal. 573	cal. 581	cal. 544	cal. 513	cal. 498	
Torrey Pines, Calif. ....	594	700	663	-----	-----	616	521	587	549	544	546	453	483	
	Week beginning—													
	Sept. 30	Oct. 7	Oct. 14	Oct. 21	Oct. 28	Nov. 4	Nov. 11	Nov. 18	Nov. 26	Dec. 5	Dec. 9	Dec. 16	Dec. 23	
Indio, Calif. ....	cal. 463	cal. 482	cal. 444	cal. 385	cal. 397	cal. 382	cal. -----	cal. 298	cal. 330	cal. 299	cal. 241	cal. 207	cal. 174	
Torrey Pines, Calif. ....	452	430	425	340	394	342	-----	-----	-----	-----	-----	-----	-----	
	1941, week beginning—													
	Jan. 1	Jan. 8	Jan. 15	Jan. 22	Jan. 29	Feb. 5	Feb. 12	Feb. 19	Feb. 26	Mar. 5	Mar. 12	Mar. 19	Mar. 26	
Indio, Calif. ....	cal. 301	cal. -----	cal. -----	cal. -----	cal. 350	cal. 325	cal. 319	cal. 381	cal. 330	cal. 472	cal. 423	cal. 564	cal. 498	
Torrey Pines, Calif. ....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
	Week beginning—													
	Apr. 2	Apr. 9	Apr. 16	Apr. 23	Apr. 30	May 7	May 14	May 21	May 28	June 4	June 11	June 18	June 25	
Indio, Calif. ....	cal. 621	cal. 520	cal. 625	cal. 628	cal. 632	cal. 727	cal. 732	cal. 683	cal. 712	cal. 712	cal. 740	cal. 763	cal. 751	
Torrey Pines, Calif. ....	624	407	686	399	499	682	590	651	632	496	562	692	-----	

## POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR SEPTEMBER 1941

## POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR SEPTEMBER 1941—Continued

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	East- ern stand- ard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate qual- ity	Observatory	1941		longi- tude	lati- tude	ter of disk							
			Dif- fer- ence in longi- tude	Longi- tude	Latitu- de	Dis- tance from cen- ter of disk					h	m										
											1941 Sept. 5...	12	23	7277 7273 7274 7273	-52 -7 -6 +3	306 351 352 1	+12 +15 -8 +12	52 11 16 6	48 48 291 97	5 10 14 8	G	U. S. Naval.
											Sept. 6...	10	50	7277 7274 7273 7273	-39 +6 +7 +16	306 351 352 1	+12 -7 +14 +12	39 15 10 17	48 364 24 48	10 24 4 7	VG	Do.
											Sept. 7...	14	35	7278 7274 7273	+5 +21 +31	335 351 1	-9 -7 +12	17 26 32	48 388 48	9 16 10	G	Do.
											Sept. 8...	10	59	7278 7279 7274 7273	+19 +29 +35 +43	338 348 354 2	-9 -3 -7 +14	25 32 38 44	97 36 412 97	10 6 22 11	VG	Do.
											Sept. 9...	11	21	7278 7274 7274 7273	+32 +43 +49 +59	337 348 354 4	-9 -7 -7 +12	35 45 51 60	73 48 339 73	8 15 1 1	G	Do.
											Sept. 10...	11	23	7281 7280 7278 7274 7273	-81 -67 +45 +61 +72	211 225 337 353 4	+10 -8 -9 -7 +12	81 69 47 63 72	485 12 24 339 73	3 1 6 4 1	G	Do.